MONOGRAPH OF THE CUBAN GENERA *EMODA* AND *GLYPTEMODA* (MOLLUSCA: ARCHAEOGASTROPODA: HELICINIDAE)

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ABSTRACT

The present paper is the third in a series dealing with the Cuban representatives of the land prosobranch family Helicinidae. The studies on the genus *Viana* (1968) and *Priotrochatella* (1970) have already appeared. The genus *Emoda* is assumed to have originated in Oriente Province, probably from some form of the West Indian genus *Alcadia*. From there it spread westward across the island into Pinar del Río Province. It occurs in each of the six provinces, but is absent from the Isle of Pines. The specific and subspecific taxa assigned to *Emoda* were investigated. Of the 27 taxa proposed, it is concluded that 16 are valid. In addition, one new species, *Emoda caledoniensis*, is described and the subgenus *Glyptemoda* Clench & Aguayo 1950 is raised to generic rank.

INTRODUCTION

The family Helicinidae appears in two widely disjunct areas of distribution centered in the Caribbean in the western hemisphere and in Southeast Asia and the Philippine Islands in the eastern hemisphere. The island of Cuba has an especially rich helicinid fauna, possessing no fewer than four endemic genera with numerous species. In a previous study (1968), the present authors have monographed the endemic genus *Viana*, and in 1970, their monograph on *Priotrochatella* was published. In this work we take up two more such genera, *Emoda* and *Glyptemoda*. In this series of studies, we also plan to complete the examination of all Cuban helicinids and to investigate the Cuban species of the genera *Helicina sensu stricto*, *Eutrochatella*, *Alcadia*, *Lucidella*, *Ceratodiscus*, and *Proserpina*.

Lea (1834b: 161) described the first *Emoda* as *Helicina pulcherrima* and until the appearance of Wagner's work (1907–1908), most other new species were included in the genus *Helicina*. The name

Emoda was given by H. and A. Adams in 1856 to a conglomerate of species which had few cohesive affinities. Because of this, the name was disregarded by later students of Cuban mollusks (Arango, 1878–1880; Crosse, 1888), and it first entered into general use after Wagner (1907–1908) published his extensive monograph. Although this author used only conchological and opercular characteristics, and in spite of serious defects in his work, he defined the taxon, which he considered a subgenus of *Alcadia* Gray, so successfully that all the species he considered to belong to *Emoda* are still considered to do so today. He confined the group to Cuba. H. B. Baker (1922), placing *Emoda* as a subgenus of *Schasicheila* Shuttleworth, examined the radulae of several species and chose *Helicina silacea* Morelet 1849 as the type. (See below for a further discussion of the generic and subgeneric placement of *Emoda*.) Aguayo & Jaume (1954) introduced several new taxa and briefly reviewed some of the older ones. Twenty-seven taxa have been proposed for the members of this genus; of these we recognize 16 and add one new taxon. Of the 17, 11 occur only in Oriente Province, 3 or possibly 4 in Las Villas, 3 in Camagüey, and 2 in Pinar del Río. Havana and Matanzas have only the widely ranging *E. submarginata*, which is also the only species occurring in more than one province. We have records of its occurrence in each of the six provinces of Cuba. All the other forms are found in only a single province and most of them in narrowly limited localities (Pls. 4, 5; Table 1).

Emoda is confined to the mainland of Cuba and to at least one of its satellite cayos or keys (Pl. 4). No species is known to occur on the Isle of Pines or elsewhere in the West Indies. *Emoda* probably had its origin in the eastern end of Cuba and especially in Oriente Province, since many more species exist in that area than elsewhere on the island. The most widely spread species in Oriente is *E. pulcherrima* and, with no opposing fossil records, it might be viewed as an early, if not the earliest, form of the genus. *E. submarginata*, which, with little difficulty, can be derived from *pulcherrima*, was in all likelihood the form which, because of its ability to populate lowland as well as hilly areas, spread the genus to other parts of the island. *Emoda bermudezi* and *E. najazaensis*, two forms found in Camagüey, the province immediately adjacent to Oriente, can be easily derived from *submarginata* and probably resulted from isolation in the mountain ranges of Cubitas and Najaza respectively.

The species found in Oriente occupy calcareous areas isolated by intervening volcanic rock. The isolation in the more western parts of the island results from mountain areas separated by noncalcareous lowlands. This isolation must have occurred during the late Tertiary, probably dating from the early Pliocene when Cuba more or less attained its present form. Only in this way can we account for such sharp differentiation as that shown, for example, between the two neighboring species *ciliata* and *briarea* in southern Las Villas Province.

The only area of clear overlap appears to be in the eastern part of Pinar del Río Province at the Sierra del Rosaria area of the Sierra de los Organos. Here *E. submarginata* and *sagraiana* both occur. The small form of typical *sagraiana* (see below, p. 105) is more easily derived from *submarginata* than is the larger form called "*percrassa*." It may be assumed that the former then is ancestral to the latter. As will be shown, however, isolation of the two *sagraiana* forms did not take place, and both, with numerous degrees of intergradation, occur throughout the range.

Species of *Emoda*, unlike *Viana*, are found in each of the six provinces of Cuba and occur from the eastern tip near Cabo Maisí in Oriente Province to the western limits of the Sierra de los Organos in Pinar del Río. They are largely confined to the mountain areas, except for one species

with the widest distribution, *E. submarginata* (Gray), which also occurs in the lowlands. Though *Emoda* is for the most part an upland group, it is not as closely confined to a limestone substrate as *Viana*, and it is found on the ground under rotting leaves, and on branches and vines, as well as on calcareous rocks.

Alcadia striatura (Lamarck) from Puerto Rico, the type-species of the subgenus *Striatemoda* H. B. Baker 1940, is obviously not an *Emoda*, despite Baker's doubts on this point (1940: 71). Among other differences such as size, operculum, and color, it also lacks the diagonal, slightly curved axial furrows on the protoconch. The fact that it has no spiral sculpture is not significant, since most species of *Emoda* also lack this feature.

We have not been able to examine or at least confirm the location of some pertinent type material. Dance (1966) reported that the nonmarine shells of Pfeiffer, among which were many types of Cuban land shells, became part of the Dohrn collection in the Stettin (Szczecin) Museum, Poland, where it was totally destroyed during World War II. A personal communication (July 1968) from the museum director, Dr. W. Filipowiak, confirmed this fact. The words "type destroyed" in the text of this study reflect this situation.

The types of the species described by Poey and some described by Gundlach are presumably in the Museo Poey[1] in the University of Havana. In spite of repeated requests, we have failed to obtain permission from the museum authorities to examine the collection, nor has it been possible for us to have the presence of this material in the collection verified. Nevertheless, we suppose that the material is there and indicate this assumption by writing "Type, probably MP" in the body of the text.

The specimens examined are in the collection of the MCZ, unless otherwise noted.

ABBREVIATIONS USED:

MCZ	Museum of Comparative Zoology, Cambridge, Massachusetts.
USNM	United States National Museum, Washington, D. C.
MP	Museo Poey, University of Havana, Havana.
BM(NH)	British Museum (Natural History), London.

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Genus *Emoda* H. and A. Adams

Emoda H. and A. Adams 1856, the Genera of Recent Mollusca, London, 2: 304 [as a subgenus of *Helicina* Lamarck 1799], (type-species, *Helicina silacea* Morelet 1849, subsequent designation H. B. Baker 1922: 56).

[1] A new public museum has been established recently, with exhibits housed in the former Capitol building in Havana. This museum is called the Museo Felipe Poey and should not be confused with the older Museo Poey in the University of Havana.

Description. Shell generally about 15 to 30 mm in diameter, imperforate, depressed to moderately depressed, to subglobose, dull or moderately glossy and generally solid. Color brown, green, yellow, or reddish purple, banded in occasional populations or individual specimens. Outer lip simple to considerably thickened, generally with basal notch and/or protuberance. Axial sculpture variable: smooth or with faint, irregular growth lines or with regular, irregular, or wrinkled ribs. Spiral sculpture generally wanting, or when present, consisting of rather faint incised lines or rows of small pits. Periostracum weak to strong, shining or lusterless, wanting in occasional species, sometimes raised in somewhat hirsute spiral ridges. Operculum auriculate, concave, thickest at columellar margin, thinning rapidly and becoming bladelike at outer margin. External calcareous layer of operculum nearly smooth, microscopically pitted, white, light brown, or reddish; internal chitinous layer reddish or brownish, marked by irregular, semicircular growth lines. Columellar edge raised in narrow ridge, generally straight but bent inward at top, forming a short, oblique furrow internally. Nucleus lateral and central on columellar edge.

Remarks. Emoda has at various times been regarded as a subgenus, either of *Schasicheila* Shuttleworth 1852 (Baker 1922; Thiele, 1929) or of *Alcadia* Gray 1840 (Wagner, 1907–1908; Keen, 1960). In this study, we follow Baker (1926) and Wenz (1938) and accord *Emoda* full generic rank in the subfamily Helicininae.

Although the shells of *Emoda* have several features in common with those of *Alcadia*, especially with the subgenus *Analcadia* Wagner, they are readily distinguishable. In *Emoda* the shells are generally larger, frequently considerably so, than the *Alcadia* from Cuba; the smallest *Emoda* shells are about 15 mm in diameter, whereas many species of *Alcadia* have shells considerably smaller. *Emoda* generally has a far more vivid coloration and at times is strongly sculptured. *Alcadia* is generally smooth, unicolored, or white with shades of brown or pink; these various colors are never arranged in bands. There are also constant differences in the opercula, especially at the raised columellar edge, which in *Alcadia* has the upper portion extended internally as a low, narrowly triangular protuberance, a condition not found in *Emoda*. Finally, *Alcadia* is primarily a Jamaican genus with some forms in Cuba and elsewhere, whereas *Emoda* occurs only on the main island of Cuba. The *Alcadia* closest to *Emoda* in appearance is the species *nuda* Pfeiffer 1866, and its subspecies, *E. n. bagaensis* Aguayo 1953, from Oriente. Here, however, an examination of the operculum will immediately reveal the true relationship.

The differences between *Schasicheila* and *Emoda* in shell and opercular structure are even more pronounced. The shells of *Schasicheila* are colorless and much more fragile, and the roundly inflated base gives it a shape that is never seen in *Emoda*. (See below for further discussion.) It also differs in the nature of the peristome at its insertions in the basal angle and the notch in the upper columellar angle. The wide parietal callus, found in all species of *Emoda*, is wanting in *Schasicheila*. Finally, the operculum, though superficially similar, differs as follows: in *Emoda* it always presents some color, either in the corneous layer alone or in both calcareous and corneous layers, whereas the operculum of *Schasicheila* is always white, with occasionally only a small area of light brown near the columellar ridge. The columellar margin of the *Emoda* operculum, as viewed from the side, is relatively straight or only very weakly sinuous and is more or less of the same width throughout, whereas in *Schasicheila* it is strongly bent inward at the center, and is noticeably thickest at the midline and thinnest at both terminations.

The radulae of *E. silacea, sagraiana,* and *ciliata* were described by H. B. Baker

(1922). In this discussion, we are using Baker's concepts and terms as defined on his page 30. He found that the radula of *Emoda* is typically that of the subfamily Helicininae. It possesses the central tooth complex of seven plates (one rhachidian and three paired), and a strong capituliform complex consisting of a strong, subrhomboid comb-lateral plate and a smaller, but heavy, accessory plate which is only weakly articulated with the comb-lateral. Baker found some variation among the three species he studied and felt that *ciliata* might belong in a special section. The paired central teeth and the comb-lateral are well cusped, with *ciliata* having a somewhat smaller number of cusps on the comb-lateral than the other two species. In addition, it has a few more inner bicuspid marginals than the other two: six or seven instead of four or five. Troschel (1857: 82, pl. 5, fig. 12) described and figured the radula of *E. submarginata* in much more general outline. His figure shows the accessory plate completely separated from the comb-lateral, whereas Baker demonstrates that the former articulates weakly with the latter.

Isenkrahe (1867) investigated the anatomy of *Helicina titanica* (= *Emoda pulcherrima titanica*). Bourne (1911), although he did not specifically study any *Emoda*, was able to make certain rectifications in Isenkrahe's work on the basis of his investigations of the closely allied genus *Alcadia*. Baker (1926) provided some notes on the anatomy of *E. sagraiana* and *E. submarginata*. Both Bourne (1911: 777) and Baker (1926: 35) commented on the general uniformity of the genitalia in the family and the uselessness of these characteristics for diagnostic purposes. For the present study, Dr. R. D. Turner of the Museum of Comparative Zoology dissected a specimen of *E. sagraiana* obtained from near Sumidero, Pinar del Río, which Dr. Hortensia Sarasúa of Marianao, Havana, Cuba, most graciously provided. A complete report of this investigation will be published by Dr. Turner later in this series of studies. For the moment, we are providing a few remarks and figures of the gross anatomy (Pl. 6).

In alcoholic specimens the color is variable, ranging from nearly uniformly ivory in immature specimens to dark gray or black in the adult. The base of the tentacles and the mantle are dark gray, the color gradually growing paler on the dorsal part of the foot and becoming almost ivory at the foot margin and the distal portion of the tentacles. The tentacles are long and slender, somewhat wider proximally. The eye is located on a low peduncle on the outer part of the base of the tentacle. The sole of the foot is creamy white, rounded anteriorly and bluntly pointed posteriorly. The columellar muscle at the insertion edge is long, curved, cream colored, and rounded at the interior end. The odontophore is long and curved and is provided with a short hook at the inner termination. Other details of the anatomy can be found in Baker (1926: 48).

Key to the Species of *Emoda*

1. Shell large, adult generally 24–32 mm in diameter 2
   Shell smaller, adult generally 16–22 mm in diameter 10
2. Shell strongly sculptured 3
   Shell smooth or with weak growth lines only 6
3. Sculpture regular 4
   Sculpture irregular, of strong diagonal growth lines, shell yellow ..... SILACEA
4. Sculpture of prominent spiral furrows, reddish color ..... EMODA
   Sculpture of axial lines only 5
5. Shell green, generally *c.* 24 mm in diameter ..... BAYAMENSIS
   Shell brownish red, generally *c.* 28–30 mm ..... PULCHERRIMA TITANICA
6. Lip strongly expanded and strongly reflected ..... SAGRAIANA
   Lip weakly expanded, not reflected 7
7. Shell wine colored, with white band at periphery and subsuturally ..... BRIAREA
   Shell without band 8
8. Shell rufous, periostracum olivaceous ..... CALEDONIENSIS
   Shell yellowish green 9

9. Shell with spiral lines on periostracum only ..... CILIATA CILIATA
   Shell with spiral lines incised on surface ..... CILIATA GUISANA
10. Distinct spiral as well as axial sculpture present 11
    Spiral sculpture very weak or absent 12
11. Shell with rounded carina, generally brownish ..... SUBMARGINATA
    Shell with subacute keel, generally faintly greenish ..... NAJAZAENSIS
12. Shell with distinct notch at parietal insertion of upper lip ..... BERMUDEZI
    Shell without notch 13
13. Shell shape turbinate ..... PULCHERRIMA PULCHERRIMA
    Shell shape subglobose 14
14. Sculpture of diagonal, straight, regular lines ..... BLANESI
    Sculpture of vermiculate wrinkles 15
15. Shell small, adult reaching 16 mm ..... MAYARINA MAYARINA
    Shell larger, adult reaching 22 mm 16
16. Sculpture strong, shell reddish green ..... MAYARINA GUTIERREZI
    Sculpture narrower, color reddish ..... MAYARINA MIRANDENSIS

Emoda silacea (Morelet)

Plate 1, figures 20, 21; Plate 5.

Helicina silacea Morelet 1849, Testacea Novissima Insulae Cubanae et Americae Centralis, 1: 20 (Cuba; type-locality, here restricted, El Yunque de Baracoa, Oriente; 3 syntypes, BM(NH) 1893. 2.4.813–15).

Helicina ochracea Poey 1851, Memorias Historia Natural Isla de Cuba, 1: 112, pl. 11, figs. 1–4 (Baracoa; type, probably MP).

Helicina silacea Morelet, Pfeiffer 1862, Novit. Conch., 2: 197, pl. 52, figs. 11–15.

Alcadia (*Emoda*) *silacea* Morelet, Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 100, pl. 18, figs. 10–12, 15.

Description. Shell reaching 28.5 mm in diameter, depressed turbinate, rather rough and solid. Whorls 4½, flattened, body whorl moderately inflated. Color pale greenish yellow, occasional specimens showing a faint brownish tinge, the color stronger at the interstices than on the axial cords. Some specimens with lighter peripheral band bordered by subperipheral brown band of varying width; spire and base generally lighter. Spire moderately raised, rounded. Aperture semilunate, outer lip unevenly curved, columella white, short, weakly convex above, concave below. Peristome strongly flaring but weakly reflected above, unevenly thickened, widest and thickest at or near the periphery, narrow above where it merges into the parietal callus, and below where there is a small protuberance of varying shape. Parietal callus thin, white in the columellar area, transparent near outer margin. Suture weakly impressed. Penultimate and body whorls prominently marked by more or less irregular, diagonal, somewhat wavy axial cords, separated by wider but quite shallow intervals. Sculpture weak on the early postnuclear whorls. Protoconch 1½ whorls, lighter in color than the rest of the shell, flattened, marked with faint, curved, diagonal, axial wrinkles. Periostracum thin and lusterless. Operculum as in genus, reddish in color, the internal corneous layer darker than the external, moderately lustrous calcareous lamina.

Height mm	Diameter mm	
17.0	28.5	El Yunque, Baracoa, Oriente
17.0	27.5	El Yunque, Baracoa, Oriente
15.5	23.5	Mayarí, Oriente
15.5	21.5	Finca "La Caridad," near Baracoa, Oriente

Remarks. This species is well characterised by its large size, prominent diagonal axial ornamentation, and striking uniformity of color, yellow predominating, with occasional specimens having a brownish tinge. At the type-locality, a large number of specimens have a lighter peripheral band bordered by a brown subperipheral band of varying width. The typical forms seem to be confined to El Yunque itself, the specimens from Mayarí being somewhat smaller and the ones from Finca "La Caridad" considerably so. This variation in size in different populations is quite common in the genus, and may be associated with the size of the area inhabited and/or variations in other features of the locality, such as the availability of food, shelter, etc. *E. silacea* differs from *pulcherrima titanica* of about

the same size, in color, in being more depressed, in having a thicker lip and more irregular and lower axial costae.

Poey described *ochracea* because he failed to find the decussate base that Morelet had mentioned in his description of *silacea*. However, as Pfeiffer pointed out (1862: 198), Morelet was in error because he did not have a large enough sample when he wrote his description and considered an occasional variation to be a consistant feature.

Specimens examined. ORIENTE. El Yunque de Baracoa; Mayarí; Soledad, Guandoa, Baracoa; Finca "La Caridad" on road from Baracoa to Duaba.

Emoda sagraiana (Orbigny)

Plate 1, figures 16–19; Plate 4, figure 1.

Helicina sagraiana Orbigny 1842, Mollusques, *in* Sagra, Histoire Physique, Politique et Naturelle de l'Ile de Cuba, 1: 240, pl. 18, figs. 12, 13 (l'intérieur de l'Ile de Cuba; Cerro de Cuzco [not "aux environs de Trinidad"]; 4 syntypes, BM(NH) 1854.10.4.163).

Helicina sagra Sowerby 1847, Thes. Conch., 1: 3, pl. 1, fig. 10, pl. 3, fig. 126 (Cuba [error for *H. sagraiana* Orbigny]).

Trochatella (*Viana*) *sagra* "d'Orbigny" Chenu 1859, Manuel de Conchyliologie, Paris, 1: 496, fig. 3691 [error for *sagraiana*].

Helicina catalinensis Pfeiffer (July) 1856, Malak. Blät. 3: 56 (prope Catalina, provincia occidentalis insulae Cubae; type destroyed); Pfeiffer (Dec.) 1856, Novit. Conch., 1: 83, pl. 23, figs. 1–6.

Helicina cataliniana Sowerby 1866, Thes. Conch., 3: 278, pl. 1, fig. 8 [error for *catalinensis*].

Alcadia (*Emoda*) *sagraiana* d'Orbigny, Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 94, pl. 17, figs. 1–4, pl. 18, fig. 13.

Emoda sagraiana percrassa Aguayo & Jaume 1954, Torreia, 21: 12, pl. 1, figs. 1–3 (Luis Lazo, Provincia de Pinar del Río; holotype, MP 17341).

Description. Shell 17 to 29 mm in diameter, depressed to moderately raised, generally smooth. Whorls about 5¼, very slightly rounded, body whorl depressed, rather narrowly rounded at the periphery. Color generally brownish, from pale yellowish buff to bright orange-brown; occasional specimens with an olivaceous tinge, others with a lighter peripheral band, spire and callus frequently reddish. Spire moderately raised, rounded, domelike, the same color as the rest of the shell, occasionally reddish, rarely darker, sometimes lighter. Aperture widely semilunate, somewhat extended laterally and more or less regularly rounded in peripheral region, white near lip, brownish in the interior. Lip thickened, occasionally very much so, slightly flaring, rarely reflected above. Basal callus slightly raised, white in columellar region, transparent near outer margin, as extensive as, but more rounded than, the aperture. Columella short, oblique, white, concave below; basal notch usually deep, acute or obtuse; basal tooth low, rounded. Suture moderately impressed. Axial sculpture of very fine, irregular, diagonal growth lines. Spiral sculpture wanting. Protoconch 1¼ whorls, sublustrous, slightly raised, faintly marked by curved, retractive, axial wrinkles. Periostracum thin but strong, light or dark brown or olivaceous, in some specimens brown tinged with green. Operculum as in genus, large, strong, calcareous lamina white, or tinged with faint reddish brown, generally on one plane but curved sharply and shortly inwardly below; internal corneous lamella thin, brownish, somewhat darker at the margins.

Height mm	Diameter mm	
21.5	29.0	La Claraboya, Luis Lazo
17.5	28.3	Ensenada de los Burros, Cabezas
17.5	26.0	Caiguanabo, Consolación del Norte
17.5	25.5	Bejarano, Canalete
16.0	25.5	Galalón, San Andrés
16.0	24.5	Catalina, San Diego de los Baños
15.5	23.5	Sierra Paso Real, Guane
15.5	23.3	Cafetal "La Villa," Candelaria
15.0	23.5	Galalón, San Andrés
14.5	24.0	Pan de Azúcar, Viñales
13.5	19.5	La Muralla, Guane

Remarks. A highly polymorphic species, *E. sagriana* varies from a small brownish form with an acute basal notch and relatively thin peristome to large greenish forms with a red spire and/or callus and an exceedingly heavy lip. In between are

found all kinds of intergrades scattered throughout the range. The smallest forms come from around Guane near the western terminus of the Sierra de los Organos, but almost similar forms are found near Catalina, toward the eastern end. The heavy, thicklipped form, to which Aguayo & Jaume gave the subspecific name of *percrassa*, occurs generally in the region of Luis Lazo, Sumidero, and Cabezas, in the west central portion of the Sierra de los Organos; specimens which cannot be separated from those found here also occur, together with the smaller, more typical specimens toward the east at San Andrés, Consolación del Norte, and San Diego de los Baños. The populations at Ensenada de los Burros in Cabezas and at Finca "La Güira" near Luis Lazo can be readily divided into the small brownish form with the acute notch and thin lip, and the large, heavy lipped form with the obtuse notch and heavy peristome. The complete lack of intergrades in these localities argues strongly that here are two distinct sympatric groups that readily deserve specific distinction. These clear differences, however, fade away in the populations from the eastern end of the range around the Sierra San Andrés and San Diego de los Baños, where many arbitrary decisions are needed to place the majority of the specimens.

Aguayo & Jaume (1954: 4) well described the confusion that seems to exist: "We are confronted by the following dilemma: either we name all the variants which occupy more or less restricted areas ('microspecies' or incipient subspecies), thus increasing the confusion of the present nomenclature, or we put all the diverse forms under a single specific name, thereby creating the error of postulating a uniformity that is far from the truth" (translated). They go on to suggest that only the two extreme forms be given names (*sagraiana* and *percrassa*) and that the intermediary colonies be designated by the "conventional" formula: *Emoda sagraiana* Orbigny tr. *percrassa*. This is obviously no solution, since the determination of just where extreme forms end and the intermediary forms begin will have to be largely subjective. Moreover, we agree with Mayr (1969: 46) who wrote, "Now that it is being realized that every local population is different from every other one, even if they live only a few miles apart or less . . . . there is no longer any excuse for a formal recognition of innumerable local subdivisions of subspecies." On the basis of the data and the large amount of material available to us at present, we can only conclude that we are dealing with a highly complex and variable species whose component parts cannot be completely understood without intensive biometric and ecological study. For the present, we feel that least confusion will result if all the *Emoda*-like populations in the Sierra de los Organos mountain complex are considered *sagraiana*. This interpretation should prove as utilitarian as calling all the polymorphic populations of the littoral marine species *Thais lapillus* in the Western Atlantic or *T. lamellosus* in the Eastern Pacific.

Specimens examined. Pinar del Río. *Guane:* Sierra de Guane; "Sierra Mendoza"; Sierra Paso Real; La Muralla; Punta de la Sierra. *Luis Lazo:* Sierra San Carlos; La Caoba; Sierra Los Acostas; La Cetricina; La Claraboya; La Güira; El Potrerito; La Estrechura; El Junco; Ensenada del Barrio, Pica Rica, and Mogote La Güira, Sumidero. *Cabezas:* Valle Isabel María; Ensenada de los Burros; Sierra La Majequilla, Petiablanca; Ensenada Chica; Valle de Cabezas; Mogote Cementerio; Sierra del Quemado. *Viñales:* Potrero de Manuel Sánchez near Capón; Arroyo Melindre; Kilometer 14; Mogote de la Vega No. 3; Mogote Capón; Sierra Penitencia; Sitio del Infierno; Sierra Derrumbada; Sierra Celadas; Sierra Celadas on the road to La Mina Matahambre; Mina Matahambre; Hoyo de los Cimarrones, Sierra del Infierno; El Cuajaní; Los Peladores at summit of Sierra del Infierno; Sierra del Infierno; Sierra el Martillo; El Queque; Ensenada del Valle,

El Queque; Sierra de Galeras; Mogote Pequeño; Mogote Rojas; Mogote Dos Hermanos; Puerta del Ancón; Lorenzo López, 1 km N of Viñales; Hoyo Jutía; El Cejanal; Hoyo de Fania, Palmarito; Ensenada de Martín Miranda, Palmarito; Hoyo de Lorenzo Martínez, Palmarito; Las Delicias; Cueva de los Santos, Palmarito; Sierra de Palmarito; Mogote Quillo; El Punto, Pan de Azúcar; Pan de Azúcar; Hoyo Largo, San Antonio; Hoyo de los Muertos; Mogote José María García. *San Vicente:* La Chorrera; Mogote la Mina Constancia; Mogote Jutía, 1 km E of Baños de San Vicente; Baños de San Vicente; Ensenada de los Baños; Mogote Pequeño, Costanera de San Vicente; Hoyo del Ruiseñor, Ancón; Cueva del Río, Baños de San Vicente; Costanera de San Vicente; Mogote de la Resbalosa; Mogote del Marmol and Laguna de Piedras; Sierra del Abra; Punta de la Costanera de San Vicente; Ensenada de San Vicente; Las Cuevitas, Ancón; Puerta del Ancón. *Consolación del Norte:* Monte Largo, Pico Chico; Mogote Caseajal near Pico Chico; Mogote Grande SW of Pico Chico; Puertecitos de Caiguanabo; Los Portales, Caiguanabo; Farallón de las Avispas; Pico Grande; Bejarano, Canalete; Abra de Bejarano; "Sierra Canalete"; Sierra San Andrés; La Sierra; Sitio de la Sierra; Mogote de la Cidra; Mogote de la Palma; Mogote el Indio; Ensenada de la Ayúa; Pasada de la Ayúa; La Jagua; La Jagua de Azquiz; Sierra Gloria, N of Colmillo de la Vieja; Colmillo de la Vieja; Los Caracoles; Abra de la Colmena; Colmena de Piedra, Galalón; Sierra Grande, Guacamaya. *San Diego de los Baños:* Mogote de la Finca; Mogote el Bosque; La Catalina, N of San Diego; Cayito, 3 mi. from La Catalina; Hoyada de la Catalina; Mogote Colorado; Pinalito; Mogote de los Indios; Los Cayitos, Catalina, N of San Diego de los Baños; Cueva del Indio. *Guajaibón:* San José de Sagua; SW of Pan de Guajaibón; San Juan de Sagua; Sierra Chica; Rancho Lucas, W of Guajaibón; Sierra de Juan de Guacamaya, Bahía Honda; Hato Sagua; Caimito; La Furnia; Sierra la Güira; El Toro, Sierra Limones. *Cabañas:* El Guabinacho; 2 mi. N of Santa Cruz; Las Animas, Rangel; El Retiro, Rangel; El Mamey, Callajabos (Cayajabos); Loma de Gloria; Rancho Mundito, Rangel; Subida al Rangel; El Taco. *Candelaria:* Escuela de Frias; Cafetal "La Villa."

Emoda pulcherrima pulcherrima (Lea)

Plate 1, figures 14, 15; Plate 2, figures 13, 14; Plate 3, figures 6, 7; Plate 5.

Helicina pulcherrima Lea 1834, Trans. American Phil. Soc. (NS), 5: 49, pl. 19, fig. 57 (Java?); 1834, Observations on the Genus *Unio*, Philadelphia, 1: 161, pl. 19, fig. 57 ("Java?"; lectotype, probably figured specimen, here selected, USNM 104613; paralectotypes, USNM 104613a, 104609, 104595, all from Lea collection; type-locality, here selected, Guantánamo).

Helicina crassa Orbigny 1842, Mollusques, *in* Sagra, Histoire Physique, Politique et Naturelle de l'Ile de Cuba, 1: 243, pl. 19, fig. 5 [not fig. 6] (intérieur de l'Ile de Cuba; type, BM(NH) 1854.10.4.167).

Helicina pulcherrima Lea, Pfeiffer 1850, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 1, p. 17, pl. 1, figs. 5–7, pl. 6, figs. 5, 6 (die Insel Cuba).

Helicina rubrocincta Poey 1854, Memorias Historia Natural Isla de Cuba, 1: 417, pl. 33, figs. 16–19. ("Probablemente en el departmento oriental"; type, probably MP.)

Description. Shell about 18 mm in diameter, depressed globose, strong. Whorls 4½, flat, body whorl descending shortly near the aperture. Color varied, light green with darker green, irregular, faintly sigmoid, axial bands, or light to dark reddish brown; spire usually lighter. Occasional specimens have a narrow, light-colored peripheral band. Spire moderately raised, rounded. Aperture widely semilunate, white inside; peristome thickened, moderately reflected, widest at center, gradually narrowing at extremities, with a small, elongate, rounded, toothlike protuberance near the basal notch. Columella short, white, barely convex, more strongly so below the mid-point. Parietal callus strong, as wide as the aperture, white in the columellar region, darker

near the outer, rounded edge; in occasional specimens the entire callus is white, a possible gerontic sign. Body whorl sculptured with strong, regular, rounded axial cords, wider than the intervals, weaker and less regular on the base and the spire. Protoconch 1½ whorls, moderately raised, with irregular, curved axial wrinkles. Periostracum strong, shining, usually wanting on early whorls. Operculum with white or light reddish calcareous lamina, and brown or reddish corneous one.

Height mm	Diameter mm	
15.1	20.6	Lectotype (USNM)
15.5	21.5	Mayarí, Oriente
13.5	19	Monte Turquino, Oriente
13.0	19	Los Arroyos, Miranda, Oriente
11	16.5	Loma del Gato, Guantánamo, Oriente

Remarks. This subspecies is confined to the entire southern portion of Oriente Province. It is characterized by its generally small size, green or brown color, and especially by the strong, regular axial sculpture on the body whorl. Even brown specimens, which superficially resemble *submarginata*, can be distinguished by their sculpture. Near the Loma del Gato in Guantánamo, there is a well-marked race of small specimens in which the color is grayish green or pale olivaceous with a light-colored spire and strong basal callus. They have the characteristic strong axial ridges.

We agree with Pfeiffer (1850: 17) that *crassa* Orbigny is synonymous with *pulcherrima*. Orbigny wrote, "fortement striée dans le sens de l'accroissement" (1842: 243), which is characteristic of *pulcherrima* (pl. 3, figs. 6, 7). We have no way of judging *crassa* from Cajo [sic] Seco, "westlich von Cuba" (Wagner, 1907: 98, pl. 19, figs. 5, 6). This is certainly an error in locality.

Poey gave the name *rubrocincta* to specimens of *pulcherrima* with a rather vivid red and white peripheral band. But in *pulcherrima*, as in other species of *Emoda*, banded and unbanded forms exist in the same populations. Lea (1834b: 162) noted that the species had an "indistinct white and brown band," and in his remarks, he mentioned the fact that the band sometimes consists of a white line only. We therefore follow Wagner (1907: 97) in recognizing *rubrocincta* Poey as a synomym of *pulcherrima*.

The lectotype, here selected, appears to be the specimen figured by Lea. Both have the same dimensions and the descriptions agree. The copied label in the USNM read "Cuba," though Lea's (erroneous) locality was "Java." No original Lea label was found.

Specimens examined. Oriente. Níquero; Road to Mora; La Vigía, E of Mora; Pico Turquino; Loma del Gato; Mountains N of Imias; Finca "Santa Teresa," Barrio Florida, Songo; Los Arroyos, Miranda; Banabacoa; Dos Bocas, N of Santiago de Cuba (USNM); Santa María de Loreta, near Tiarriba (USNM); Loma Gran Piedra, N of Santiago de Cuba (USNM); between Aguadores and Las Lagunas, E of Santiago de Cuba (USNM); loma (hill) E of Siboney (USNM); road from Loma de la Bandera near Pinar de Mayarí; woods at Arroyo Blanco, Mayarí (USNM); Canapa, Mayarí; El Purio, Mayarí.

Emoda pulcherrima titanica (Poey)

Plate 2, figures 8, 9; Plate 5.

Helicina titanica Poey 1851, Memorias Historia Natural Isla de Cuba, 1: 110, pl. 11, figs. 13–16 (las costas de Baracoa [Oriente]; type[1], probably MP).

Helicina titanica Poey, Pfeiffer 1862, Novit. Conch., 2: 196, pl. 52, figs. 6–10 (Mata [Baracoa]).

Alcadia (*Emoda*) *pulcherrima titanica* Poey, Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 99, pl. 17, figs. 13–15, pl. 18, fig. 16.

Description. Shell like that of *pulcherrima* but differing from the nominate form in its generally considerably larger size,

[1] The type-specimens can be identified by the crab hole (10 mm × 5 mm) in the columellar region (Poey, 1851: 111).

which reaches 29 mm in diameter. The color is more uniformly brownish; occasional specimens have an olivaceous tinge. The characteristic strong axial sculpture is easily apparent, even to the naked eye.

Height mm	Diameter mm	
23.0	29.0	Baracoa, Oriente
21.0	28.0	Mandinga, Baracoa, Oriente
20.5	26.0	Barigua, Oriente
18.0	25.0	Baracoa, Oriente
16.5	21.0	Veguitas, Baracoa, Oriente

Remarks. This subspecies is limited to the area around Baracoa, Oriente. This distribution and its considerably larger size would be enough to regard it as a full species, but the only difference in shell morphology from *pulcherrima pulcherrima* is its size. Consequently we concur with Wagner in considering it a subspecies. One lot of four specimens from Veguitas, Baracoa, can almost be regarded as intermediate in size between *p. pulcherrima* and *p. titanica.*

Poey described this form from a series of dead shells, each of which had a hole in the columellar region. Poey thought the shells had been perforated by the animal to provide more space for its oversized body (1851: 110). Pfeiffer (1862: 197) correctly identified the holes as having been made by hermit crabs, which inhabit empty shells. (See also Arango, 1878: 87).

Specimens examined. Oriente. *Baracoa:* Veguitas; Mandinga; Barigua; Boca de Yumurí; La Cantera de Miranda; Mata; Manglito, Barigua.

Emoda submarginata (Gray)

Plate 1, figures 1, 2; Plate 4, figure 2; Plate 5.

Helicina submarginata Gray 1825, Zool. Jour., 1: 68, pl. 6, fig. 11 (no locality given; type-locality, here restricted, Sierra El Grillo, near Cotorro, Havana Province, Cuba; type,[1] BM(NH) ?).

Helicina rubra Pfeiffer 1839, Wiegmann, Arch. Naturg., 5th year, 1: 355 (Cuba); type destroyed.

Helicina submarginata Gray, Orbigny 1842, Mollusques, *in* Sagra, Histoire Physique, Politique et Naturelle de l'Ile de Cuba, 1: 244, pl. 19, fig. 8 [not 7] (l'intérieur de l'Ile de Cuba).

Helicina submarginata Gray, Pfeiffer 1850, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 1, p. 16, pl. 1, figs. 8–10 (Matanzas, Retiro).

Alcadia (*Emoda*) *pulcherrima planospira* Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 98, pl. 19, figs. 8–10 (die Insel Cuba; type in Warsaw Zoological Museum 8338).

Emoda zayasi Aguayo & Jaume 1954, Torreia, No. 21, p. 12, pl. 2, fig. 7 (Sierra del Cristal, Sagua de Táñamo, Provincia de Oriente, Cuba; holotype, MP 17366).

Description. Shell 15 mm to 20.5 mm in diameter, depressed conic, strong, barely carinate. Whorls 5½, flattened, body whorl barely descending at aperture. Color varied, yellowish olivaceous with light green spire, or reddish with a pale orange base, or reddish brown with paler spire and base, usually with light colored, narrow peripheral band. Spire moderately raised, broadly depressed conic or low turbinate, generally same color as rest of shell. Aperture sublunate, palatal lip thickened, barely expanded, with a shallow notch just in front of a low basal tooth. Columella white, gently concave, barely rounded at insertion in basal portion of lip and extended into a triangular lamella that ends at the basal tooth. Parietal callus porcellanous, as wide as the aperture, ground color of shell showing through on outer margin. Sculpture of variously strong, diagonal growth lines and a few widely spaced, concentric spiral lines, seen as slightly raised cords in the periostracum. These periostracal cords are reflected as lines of minute pits in the shell surface. Protoconch 1½ whorls, usually lighter in color than the rest of the shell, faintly marked with gently curved, diagonal, irregular axial wrinkles. Periostracum thin, usually absent on upper whorls. Operculum as in genus, calcareous layer lustrous, thin, white, internal corneous lamina orange-brown.

[1] Peake writes (in litt.) that the BM(NH) has several lots of specimens, but nothing to identify any as the type.

Height mm	Diameter mm	
13.0	20.0	Yaguajay, Las Villas
12.5	20.5	El Grillo, Havana
12.0	18.0	Piedras de Amolar, Escambray, Las Villas
11.5	15.0	El Retiro, Matanzas

Remarks. This species ranges from the eastern[1] part of Pinar del Río Province at Artemisa to Mayarí in Oriente and thus has the most extensive range of any *Emoda*. The distribution is not continuous. This discontinuity is probably due to incomplete collecting in the intervening areas. We have but a single record of this species from Camagüey. This province, however, is probably the least collected area in Cuba. In Camagüey, *submarginata* is replaced in two important localities, Sierra Najaza and Sierra Cubitas, by the closely related species *najazaensis* and *bermudezi*, respectively.

E. submarginata is quite uniform throughout its range. The color varies somewhat from dark brown to light brown, and some olivaceous specimens appear. Occasional specimens have a light colored peripheral band. The incised spiral cords vary in strength but some indications of them are usually present. There is likewise little significant variation in size. The smallest specimens are from El Retiro, Matanzas (15 mm in diameter), and the largest from Havana (20.5 mm), but the great majority vary between 18 and 20 mm.

The color, weak axial ribs, and the presence of spiral lines on *pulcherrima planospira* Wagner place this form in the synonymy of *submarginata* rather than in *pulcherrima*.

Specimens examined. Pinar del Río. Las Cañas; Las Mangas, Artemisa; foothills of Rangel. Havana. San Antonio de los Baños; Sierra El Grillo (type-locality); Sitio Perdido; Loma Camoa; Mantilla; Madruga; El Inglés; La Canabrava; Finca "La Belianza," Cotorro; Peña Blanca, Sierra Anafe; Jaruco. Matanzas. Elena, El Palenque; Cotorra; Dos Cecilias, Coliseo; Jaguey Grande; Abra de Figueroa, Valle de Yumurí; Cueva el Negro, San Miguel; Canasí Rd., near El Pacito; Loma del Fine, Cárdenas; Bridge over R. Canímar, Matanzas-Limonar Rd.; 20 mi. SE of Matanzas; Ceiba Mocha; Vista Alegra (USNM). Las Villas. *Soledad:* Mogote el Palmar; Botanical Garden; Guabairo; Loma de la Jutía, Vilche's Potrero; Sagua la Grande; Mina Carlota, about 12 mi. E of Soledad; Laza del Medio; El Mamey; San Lorenzo; Jumagua; Mogote W of La Jumagua. *Trinidad:* Northwest of La Vigía; Sierra de Santa Rosa. *Yaguajay:* Yaguajay-Remedios Rd.; Cerros de Yaguajay; Guainabo; El Tigre; Punta Judas; Sierra Judas de la Cumagua. *Remedios*: El Mamey; Los Hatillos; La Culebra; Loma Caraballo; Dos Sierras; Buenavista; La Puntilla (USNM); Cerro Guajabana. *Caibarién:* Finca "Cueta"; Loma de Petrera; Punta Caguanes, Buenavista Bay; Santa Rosa; Cayo Conuco; Cayo Lucas; San Joaquín, Esperanza; El Boquerón, Jatibonico; San Agustín, Zulueta; Piedras de Amolar, Escambray; Villa Ciba, Carretera de Camajuaní; Chicharrón, Sierra Vega Alta; La Vigía, Mayajigua; Sierra de Canoa, Los Llanados; Monte Cagüeiras, Sancti Spiritus; Sierra 3 km S of Dolores. Camagüey. Punta Alegre. Oriente. Camino de la Loma de la Bandera, Pinar de Mayarí; Mayarí; between Sagua de Táñamo and Cananova.

[1] Forcart (1950: 71) identified *E. submarginata* from Pinar del Río between the city of Pinar del Río and Viñales. We have not seen the specimens but suspect that the identification is in error.

Emoda ciliata (Poey)

Plate 1, figures 7–9; Plate 4; figure 1.

Helicina ciliata Poey 1851, Memorias Historia Natural Isla de Cuba, 1: 109, pl. 11, figs. 5–8 (Trinidad [Las Villas]; type, probably MP).

Helicina fossulata Poey 1857, Memorias Historia Natural Isla de Cuba, 2: 25 (Trinidad, [Las Villas]; syntypes, probably MP; paratype, MCZ 263901 from the Anthony Collection collected by Dr. Gutierrez, San Juan de Letrán, Santa Clara [= Las Villas]).

Alcadia (*Emoda*) *ciliata* Poey, Wagner, 1908, *in*

Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 102, pl. 8, figs. 5–6; pl. 19, figs. 14–17 (Trinidad und Banao auf Cuba).

Description. Shell reaching 27 mm in diameter, strong, widely turbinate, smooth but lusterless, rounded at periphery. Whorls 5½, moderately convex, body whorl rounded at base, barely descending near aperture. Color predominantly light yellow, occasional specimens faintly tinged with brown; white when decorticated, with an indistinct, whitish subsutural band continued subperipherally on the body whorl. Spire depressed, dome shaped. Aperture widely semilunate, yellowish within. Palatal lip white, strongly thickened, moderately flaring. Basal denticle small and obtuse. Parietal callus smooth, thick, white in the columellar region, transparent near the rounded outer margin, more rounded than the aperture. Columella short, oblique, very weakly sigmoid, angled above, slightly rounded at insertion with basal lip. Suture moderately impressed. Shell smooth, marked by very fine, curved, diagonal growth lines. Protoconch 1¼ whorls, barely raised, moderately lustrous, approximately same color as rest of shell, marked by fine, curved, axial wrinkles. Periostracum strong, closely marked by irregular spiral cords of raised periostracal material, not reflected in the shell surface beneath. Operculum as in genus, light to dark reddish brown near the outer margin.

Height mm	Diameter mm	
19.0	27.0	Banao, Las Villas
19.0	25.5	Ciegos de Ponciano, Las Villas
15.5	19.5	San Juan de Letrán, Las Villas; paratype of *fossulata*.

Remarks. This relatively large-shelled species is readily distinguishable from the others of more or less equal size by its uniformly yellow color and depressed shape. It differs from *silacea*, the other species in which yellow predominates, by its smooth, almost unsculptured surface. It apparently has a limited range in the mountains between Trinidad and Sancti Spiritus in the southeastern part of Las Villas Province.

Helicina fossulata Poey is only a color form with a peripheral band. Poey wrote of *ciliata*, "Color es ya de un amarillo bajo, ya de un moreno rojizo," and of *fossulata*, " . . . . sordide rubra . . . cingulis duobus flavidis ornata, quorum alter ad suturam, alter ad peripheriam." The type locality of both forms is "Trinidad" and the only difference seems to be the presence of a spiral peripheral band in *fossulata*. Elsewhere we show that banded and unbanded forms frequently occur in single populations.

Specimens examined. Las Villas. Banao, Sancti Spiritus; Ciegos de Ponciano; Camino de Banao, Sancti Spiritus; San Juan de Letrán.

Emoda ciliata guisana (A. J. Wagner)

Plate 1, figures 10, 11.

Alcadia (*Emoda*) *ciliata guisana* A. J. Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 102, pl. 18, figs. 7–9 (Guisa auf Cuba; types in Warsaw Zoological Museum 8353).

Description. Shell like that of *ciliata*, differing from the nominate form by the presence of shallowly incised, parallel, spiral lines on the shell, as in *submarginata*. These lines seem to correspond to periostracal structures found in *ciliata ciliata*, but in that subspecies they do not affect the shell, being found in the periostracum only. Color yellowish, as in *ciliata*, but in some specimens there is a faint reddish tinge.

Height mm	Diameter mm	
18.5	25.5	"Cuba"
18.0	25.0	[Guisa, Bayamo, Oriente] (?)

Remarks. Wagner stated that this subspecies came from "Guisa auf Cuba." Some students have taken this to mean Guisa, near Bayamo in Oriente Province. This is most unlikely, since *ciliata ciliata*, whose distribution is limited to central Las Villas, has not been found in Camagüey Province,

which separates Las Villas from Oriente Province. Either there is a Guisa—a small finca or miniscule settlement—in Las Villas, or Wagner's locality is in error. The military map of Cuba cites no Guisa from Las Villas. We are keeping this name provisionally since the material at hand is not sufficient to indicate whether the incised spiral lines are characteristic of individuals or of an entire colony.

Specimens examined. "Cuba"; Guisa.

Emoda emoda (Pfeiffer)

Plate 2, figures 6, 7; Plate 5.

Helicina emoda Pfeiffer 1865, Novit. Conch., 2: 253, pl. 64, figs. 6–8 (parte orientali ins. Cubae; [Monte Toro, based upon Pfeiffer 1860: 77]; type destroyed).

Alcadia (*Emoda*) *sagraiana emoda* Pfeiffer, Wagner 1908, *in* Martini & Chemnitz, Conch.-Cab., (2) 1: sect. 18, pt. 2, p. 96, pl. 17, figs. 7–9.

Description. Shell reaching 31 mm in diameter, moderately strong and relatively smooth. Whorls 5½, moderately rounded, body whorl depressed, descending sharply at aperture. Color of body whorl bright green, reddish brown when decorticated; spire reddish, periphery banded by a whitish line margined above and below by dull, narrow, reddish bands. Spire relatively high and dome-shaped. Aperture widely semilunate, white inside; peristome thickened, moderately flaring, not reflected, basal tooth generally weak. Parietal callus smooth, rounded, larger than the aperture, white near the columella and transparent near the outer margin. Columella short, white, slightly sigmoid, the wider curve below, and briefly rounded near the basal tooth. Suture moderately impressed, roughened by the terminations of the growth lines. Sculpture of low, irregular, moderately strong growth lines crossed by impressed, closely spaced spiral furrows, most closely approximated at the base and weaker on upper whorls. Protoconch 1¼ whorls, reddish, smooth, faintly marked by irregular, curved, diagonal axial riblets. Periostracum strong, green on body whorl, weaker and reddish on spire. Operculum as in the genus.

Height mm	Diameter mm	
23.5	31.0	Manatial, Santa Fé, Oriente
22.0	30.5	Guaso, Guantánamo, Oriente
18.0	28.0	El Codrito, Monte Libano, Oriente

Remarks. This is a well-marked species from near Guantánamo in Oriente Province. Pfeiffer thought it might be related to *briarea* from Las Villas Province because of its large size, but *emoda* has a more elevated shape, the shell is not so solid, the color differs markedly and the spiral sculpture is completely wanting in *briarea*. Wagner (1907: 96) confused it with the larger *sagraiana* from Luis Lazo in Pinar del Río Province, but that shell is somewhat smaller, more depressed, heavier, has a far thicker, more reflected lip, and lacks the spiral sculpture. Pfeiffer's figures are of decorticated, weathered specimens but they show (especially his fig. 8) the spiral sculpture quite clearly. This species is remarkably constant in its color but, like many *Emoda*, it varies in size. The populations from Monte Libano consist of smaller shells which, however, clearly belong to *emoda* because of the elevated shape, the green and reddish color, and the presence of spiral lines. Although the type-specimens have been destroyed, there is no doubt regarding the identity of this species. Pfeiffer's figures are unusually good and we have examined several lots from near the type-locality.

Specimens examined. ORIENTE. La Subida de la Hembrita; Guantánamo; El Codrito; Monte Libano; Montaña de Guantánamo; Manatial de Santa Fé; 1 mi. NW of Guaso; N of Guantánamo City.

Emoda caledoniensis, new species

Plate 2, figures 11, 12; Plate 5.

Holotype, MCZ 261352, from Mina Caledonia, Mayarí, Oriente. L. R. Rivas, collector.

Paratypes, MCZ 261350; USNM 463790, both from the same locality as the holotype; MCZ 261348, from Brazo del Pino, Woodfred, Mayarí, Oriente; MCZ 261351 from Sierra del Cristal, Mayarí, Oriente.

Height mm	Diameter mm	
21.5	30.5	Brazo del Pino, Paratype
21.0	28.0	Brazo del Pino, Paratype
20.0	29.0	Sierra del Cristal, Paratype
19.5	28.0	Mina Caledonia, Holotype
17.0	24.0	Mayarí, 1 km from the pine forest, Paratype

Description. Shell reaching 30.5 mm in diameter, inflated, smooth and moderately solid. Whorls 5½, moderately rounded, body whorl inflated, weakly shouldered obliquely below the suture, rounded at the periphery, shortly descending near the aperture, where it blends into the basal callus. Color olivaceous, with irregular darker axial streaks, light brick red in decorticated specimens. Spire moderately raised, rounded, darker than rest of shell. Aperture semilunate, lip moderately thickened, flaring, barely reflected above, widest near the center, narrowing at each extremity; basal tooth small, rounded, basal notch barely perceptible. Columella short, white, slightly sigmoid and rounded below. Basal callus smooth, larger than the aperture, white in columellar region, transparent at outer margin. Axial sculpture of very fine, diagonal growth lines, spiral sculpture wanting. Suture moderately impressed, somewhat roughened by the terminations of the growth lines. Protoconch 1½ whorls, faintly marked by curved, axial wrinkles. Periostracum strong, olivaceous or green. Operculum as in genus, calcareous layer white, inner corneous layer reddish, darker at margins.

Remarks. The four lots in MCZ upon which this description is based all come from the region around Mayarí in Oriente Province. This new species belongs to the group of large, predominantly greenish or olivaceous shells with a reddish spire from the eastern part of the country. It differs from *pulcherrima titanica* from Baracoa by its higher spire and in the absence of the strong, regular, axial sculpture; it is generally smaller and more rounded than *E. emoda* from Guantánamo and lacks the spiral sculpture of closely set incised lines.

Emoda bayamensis (Poey)

Plate 2, figures 4, 5; Plate 5.

Helicina bayamensis Poey 1854, Memorias Historia Natural Isla de Cuba, 1: 416, pl. 33, figs. 7–10 [not 8–11] (Bayamo [Oriente]; lectotype, here selected, MCZ 73855, Buena Vista, Bayamo, Oriente, Anthony Collection, from Poey; paralectotype MCZ 256496, same locality. The shells in MCZ from which the type selections were made were identified as type material by Torre in June 1912).

Helicina bastidana Poey 1854, Memorias Historia Natural Isla de Cuba, 1: 415, pl. 33, figs. 11, 12 (Puerto Príncipe [= Camagüey]; type, probably MP).

Helicina bayamensis Poey, Pfeiffer 1862, Novit. Conch., 2: 199, pl. 53, figs. 1–5.

Helicina jeannereti Pfeiffer 1862, Malak. Blät., 9: 6 (Mayarí [Oriente]; type destroyed).

Helicina bayhamensis "Poey" Reeve 1873, Conch. Icon., Helicina, 19: pl. 2, fig. 11 (Cuba) [error for *bayamensis*].

Helicina bastidiana "Poey" Reeve 1873, Conch. Icon., Helicina, 19: pl. 8, fig. 61 (Cuba) [error for *bastidana*].

Description. Shell reaching 23 mm in diameter, depressed globose and solid. Whorls 4¼, weakly convex, body whorl moderately inflated, depressed but not carinate at the periphery. Color of body whorl olivaceous and sometimes tinged with brown, with narrow, irregular, dark green axial stripes; spire much lighter; occasional specimens with a yellowish peripheral band generally margined with red. Spire moderately raised, rounded, lighter in color than the rest of the shell. Aperture semilunate, irregularly rounded, inside margin of upper lip diagonal, almost straight. Lip white, well expanded, but not reflected, unevenly rounded, somewhat extended just above the periphery, widest centrally, narrowing rapidly at the extremities; basal tubercle small. Columella short, white and weakly sigmoid. Parietal callus

smooth, thin, white in the columellar region, transparent near outer margin. Suture moderately impressed. Sculpture of irregular, curved, axial cords, weaker and less regular than in *pulcherrima*, weaker on the base, almost obsolete on earlier whorls. Operculum and periostracum as in the genus.

Height mm	Diameter mm	
15.0	23.0	Buena Vista, Bayamo, Oriente, Lectotype
14.0	21.5	Paralectotype

Remarks. Poey described *bastidana* and *bayamensis* at the same time, but in 1865 (p. 144) he selected *bayamensis* as "el tipo común" and wrote that *bastidana* "es una variedad, y muy rara." It seems to be nothing but a color variant.

This species differs from the larger *Emoda* by the irregular rather than rounded inner edge of the periostome. There is a distinct rounded angle above and below the periphery; in other *Emoda* this entire area is evenly rounded. In fully adult shells there is also an extension of the central portion of the outer lip, so that the shell has a somewhat lengthened rather than a rounded appearance. This feature is illustrated by Poey (1854, pl. 33, figs. 11, 12) and is present in the lectotype. Submature shells generally lack this characteristic. The species differs from *pulcherrima titanica* in its smaller size and weaker axial costae. It differs from *ciliata* in its lively colors and comparatively stronger axial sculpture, and from *sagraiana* from the other end of the island, in its far weaker basal notch and tooth. We could discover no feature to distinguish it from *jeannereti*. Pfeiffer, in his discussion of the latter, noted several differences between *jeannereti* and *sagraiana* but failed to compare his species with *bayamensis*. Wagner (1907: 99) cited this as a subspecies of *pulcherrima*, but it lacks the strong axial sculpture on the body whorl that is characteristic of *pulcherrima* and, at the present state of our knowledge, is probably best regarded as a species.

We have not succeeded in clearly identifying *jeannereti* Pfeiffer. The species has never been figured satisfactorily. Reeve (1874: pl. 1, fig. 3a) had a poor figure of a shell with a bright green color which he referred doubtfully to *jeannereti*. This figure seems to have been copied from Sowerby (1847: pl. 3, fig. 126), where it appears as *Helicina sagra* [sic]. Sowerby (1866, pl. 1 [266], fig. 5) figured a typical brown *sagraiana* and referred *jeannereti* doubtfully to it. The green form (fig. 6) he now called *bastidiana* (sic) [= *bayamensis*]. Arango (1879: 46) copied Pfeiffer's data but cited Wright as the collector instead of Jeanneret. Wagner (1907–1908) omitted the name from his monograph and Fulton (1915) failed to note this omission. The only specimens available for our inspection come from Palma Soriano (Bermúdez collection), about 60 km southwest of Mayarí, Pfeiffer's type-locality of the species. We do not know who made the determination. In his discussion, as we have noted, Pfeiffer did not compare his species with *bayamensis*. Hence our placing *jeannereti* in the synonymy of *bayamensis* is provisional.

Specimens examined. Oriente. La Cantera de Miranda; Buena Vista, Bayamo (type-locality); Guisa, Bayamo; Miranda, Palma Soriano.

Emoda bermudezi Aguayo & Jaume

Plate 1, figures 5, 6; Plate 4, figure 1.

Emoda bermudezi Aguayo & Jaume 1954, Torreia, No. 21, p. 10, pl. 1, figs. 4, 6 ("Paso de las Trincheras," Sierra de Cubitas, Provincia de Camagüey; holotype, MP 17346).

Description. Shell reaching 19.5 mm in diameter, rather solid, depressed conic, periphery moderately carinate. Whorls 4½, flat, body whorl descending rapidly near aperture, where it blends into the thickened, slightly raised basal callus. Color generally olivaceous at base, tinged with

brownish orange above, occasional specimens with a narrow, yellowish peripheral band. Spire low, rounded, same color as rest of shell. Aperture widely semilunate; peristome white, thickened, very weakly expanded. There is a distinct notch above near the parietal margin from which a short, raised marginal lamella extends to the basal callus. The basal callus as wide as the aperture, porcellanous, rounded, slightly raised in mature specimens. Columella weakly sigmoid, the basal tooth quite weak. Suture very slightly impressed. Later whorls marked by irregular diagonal lines of growth; surface with concentric, spiral rows of impressed pits. Protoconch 1½ whorls, slightly raised, weakly marked by diagonal and regular axial sculpture. Periostracum thin; operculum as in genus, inner corneous layer light brownish, slightly darker at the margins.

Height mm	Diameter mm	
14.5	19.5	San Francisco, near La Tinaja, Camagüey
13.0	17.5	Santa Rita, Camagüey
12.5	19.5	Paso de las Trincheras, Sierra de Cubitas, Camagüey
12.5	16.5	El Cercado de Cubitas, Camagüey

Remarks. This species is very close in its relationships to the widely distributed *submarginata*, which it resembles in color and in the presence of concentric, though weak, spiral lines that consist of a series of pits. It is easily distinguished by the sharp, triangular notch near the posterior (upper) angle of the peristome, a characteristic which, as Aguayo & Jaume pointed out (1954: 10), is found in no other *Emoda*. The color as given above, as well as the description of the operculum, is from a lot of fresh shells from the Bermúdez collection labelled merely "Camagüey." The other and better localized shells that were available were dead shells, the color having been somewhat faded or stained by reddish earth. In all specimens the concentric spiral lines were quite weak. The species apparently is limited to the Sierra de Cubitas in the northeastern part of Camagüey Province. This species, as well as *najazaensis*, was misidentified as *bastidana* Poey and appeared in the Museo Poey and other museum collections under this name. Aguayo & Jaume (1954: 11) pointed out that *bastidana* is a mere color form of *bayamensis*, an observation made originally by Poey himself (1865: 144).

Specimens examined. Camagüey. Las Cuevas; Santa Rita y la Entrada del Camino de La Guanaja [Santa Rita and the entrance to La Guanaja Highway]; Banao; Paso de los Burros; Paso de los Trincheras y Cueva de los Indios; San Francisco. N of La Tinaja; East side of Vereda de Burro, Finca San Clemente (USNM); Paso del Este (USNM); El Círculo (USNM); Los Corrales de Cangilones (USNM); North entrance to Paso Escalera (USNM). All of the above localities are in the Sierra de Cubitas.

Emoda najazaensis Aguayo & Jaume
Plate 1, figures 3, 4; Plate 4, figure 1.

Emoda najazaensis Aguayo & Jaume 1954, Torreia, No. 21, p. 9, pl. 1, figs. 7, 9, 10 ("El Cacaotal," Sierra de Najaza, Provincia de Camagüey; holotype, MP 16222; paratypes, MCZ 257558, from "Vereda del Telégrafo," Sierra del Chorillo, ex MP).

Description. Shell reaching 22 mm in diameter, smooth, depressed conic, periphery roundly carinate. Whorls 5¼, very weakly rounded, body whorl descending sharply at the aperture, where it blends into the basal callus. Color varied, pale olivaceous, pale brown, buff, or faintly orange, a pale narrow band at the periphery. Spire low, mammiform and somewhat darker than rest of shell. Aperture widely semilunate, lip slightly thickened and barely reflected. Columella shallowly concave below, weakly convex above; basal callus weakly lustrous, white, as wide as the aperture, rounded at outer margin. Basal tooth quite small. Suture moderately impressed. Spiral sculpture of closely set, concentric cords, which are raised in the

periostracum, and reflected below as a line of minute impressed pits in the shell, most prominent on the body whorl, weaker at the base. Protoconch 1½ whorls, raised nipplelike above the succeeding whorls, sculptured with faint, regular axial striae, almost the same color as the rest of the shell. Periostracum thin. Operculum closely resembles that of *E. bermudezi*, but the internal corneous layer is not darker at the margin.

Height mm	Diameter mm	
15.5	20.0	Vereda del Telégrafo, Sierra del Chorrillo, Camagüey
14.5	20.0	El Cacaotal de Sifonte, Sierra Najaza, Camagüey
13.0	19.0	El Palomar de San José, Camagüey

Remarks. This species is similar to *submarginata*, especially in color and in the presence of spiral concentric incised striae, though in *najazaensis* these are more closely spaced. However, it has a generally larger shell, which is more depressed and more strongly keeled. It appears to be confined to the area around the Sierra Najaza (Najasa) in the southeastern part of Camagüey Province. The specimens we were able to examine, including several lots from the type-locality, did not show the colors mentioned by Aguayo & Jaume (1954: 9).

Specimens examined. CAMAGÜEY. Najaza; El Palomar de San José; El Cacaotal, Najaza; Sierra Guaicanamar; Sitio Afuera; Vereda del Telégrafo, Sierra del Chorrillo; Sierra del Cochimbo; El Cacaotal de Sifonte, Sierra de Najaza.

Emoda briarea (Poey)

Plate 2, figures 1–3; Plate 4, figure 1.

Helicina briarea Poey 1851, Memorias Historia Natural Isla de Cuba, 1: 108, pl. 11, figs. 9–12 (San Diego de los Baños [sic]; lectotype, here selected, MCZ 73854, from the J. G. Anthony Collection, collected by Gundlach [Trinidad Mountains, Santa Clara (= Las Villas)]. The specimen appears originally in the MCZ collection as a syntype, identified as such by Torre in June 1912).

Helicina briarea Poey, Pfeiffer 1862, Novit. Conch., 2: 195, pl. 52, figs. 1–5 (Trinidad).

Helicina briaraea "Poey," Sowerby 1866, Thes. Conch., 3: 278, pl. 1, figs. 1–3, [error for *briarea*].

Description. Shell very large for the family, reaching 34.5 mm in diameter, depressed turbinate, solid, roundly carinate, sharply so in juvenile specimens and relatively smooth. Whorls about 5, flat, body whorl moderately inflated, flattened basally, descending shortly near the aperture. Color purplish brown on the body whorl and somewhat lighter on the spire. There is a variously wide, yellowish or whitish subsutural band that is extended as a supraperipheral band on the last whorl, where it is separated from the light colored basal area by a moderately narrow, purplish red band. Subsutural band wanting on early postnuclear whorls. Spire depressed, weakly rounded except for the slightly raised protoconch. Aperture widely semilunate, evenly rounded, white, ground color and spiral band showing through inside. Peristome expanded, barely flaring above, widest just above the periphery and slightly thickened. Basal denticle quite small, obtuse, somewhat lengthened. Parietal callus smooth, or yellowish white, more rounded than the aperture. Columella oblique, white, short, concave below. Suture weakly impressed. Sculpture of very fine, irregular growth lines, without spiral lines. Protoconch 1¼ whorls, somewhat raised, light brown, with faint, curved axial wrinkles. Periostracum thin, yellowish, not carrying the shell color, with faint, well-spaced spiral ridges. Operculum reddish, darker at margins, relatively thin.

Height mm	Diameter mm	
22.5	34.5	Puriales, Las Villas
22.0	31.5	Puriales, Las Villas
18.0	25.5	Caracusey, Las Villas
16.0	22.0	San Blas, Las Villas

Remarks. Most specimens of this species can be readily recognized by their large size. In populations where the specimens are smaller (San Blas, Ciegos de Ponciano, etc.), they are determined without diffi-

culty by their smooth surface, depressed shape, characteristic color, and by the subsutural band, which has the same color as the base. The species differs from the larger specimens of *sagraiana* from Luis Lazo in Pinar del Río Province in its color and in the far less strongly thickened and unreflected lip. It differs from *E. emoda* in its more depressed shape, stronger shell, and color. The species seems to be confined to the area around Trinidad in the south central part of Las Villas Province. As Pfeiffer noted (1862: 196), Poey's locality was in error. We here select Trinidad, Las Villas Province, Cuba, as the type-locality. Poey selected the trivial name referring to the mythological giant Briareus, because of the large size of the shells.

Specimens examined. Las Villas. *Trinidad:* Fomento; Finca Pitajones, Caracusey; Santa Rosa, Cafetal Los Puriales; Río Caballero; Portillo, Río de Ay; Río Caburní; Ciegos de Ponciano; San Blas Dam above San Blas.

Emoda mayarina mayarina (Poey)

Plate 2, figure 17; Plate 5.

Helicina mayarina Poey 1854, Memorias Historia Natural Isla de Cuba, 1: 417, pl. 34, figs. 6–8. (Mayarí [Oriente]; holotype, MP 17034).

Helicina mayarina Poey, Pfeiffer 1856, Malak. Blät., 3: 144; Pfeiffer 1858, Monographia Pneumonopomorum Viventium, Suppl. 1, p. 184; Pfeiffer 1862, Novit. Conch., 2: 200, pl. 53, figs. 6, 7.

Emoda mayarina (Poey), Aguayo & Jaume 1954, Torreia, No. 21, p. 7, pl. 2, figs. 1, 6.

Description. Shell reaching 16 mm in diameter, subglobose, solid, moderately strong, sublustrous. Whorls 4, convex, the last somewhat descending at the aperture below the periphery. Color brownish red with several faint reddish wrinkles, base somewhat yellowish, with a darker peripheral band margined above by a lighter band of approximately the same width. Spire moderately raised, submammiform. Aperture slightly oblique, subsemilunate, white at the lip, darker within. Lip simple and thin. Parietal callus very thin, white and glassy in center, transparent near outer margin. Protoconch with fine, curved axial striae that grow stronger on the later whorls and become vermiculate on the entire body whorl, being obsolete only on the base and near the aperture, where they turn into straight axial lines. Spiral sculpture wanting. Operculum not seen, but presumably like others in this subgenus.

Height mm	Diameter mm	
13.0	16.0	Mayarí, Oriente, (USNM)

Remarks. This species, according to Aguayo & Jaume (1954: 7), is exceedingly rare; the Museo Poey has only a single specimen. The shells of this species and of its two subspecies are easily identifiable by their globular shape and especially by the variously strong vermiculate or wrinkled sculpture. This latter feature alone will prevent confusion with any other species.

Aguayo & Jaume believed that the nominate species came from the mountains of Nipe or Mayarí rather than from the lowlands around the port of Mayarí as Poey stated.

This species was omitted by Wagner in his monograph (1907–1908), nor did it appear on the list that Fulton (1915) published, citing the species Wagner had overlooked.

Emoda mayarina gutierrezi Aguayo & Jaume

Plate 2, figures 15, 16; Plate 5.

Emoda mayarina gutierrezi Aguayo & Jaume 1954, Torreia, No. 21, p. 7, pl. 2, figs. 3, 5 ("Finca [Lorenzo Cobos] Estable," Mayarí Arriba, Provincia de Oriente; holotype, MP 17342; paratype, MCZ 187562).

Description. This subspecies resembles the nominate species in the globular shape of the shell, but differs in being larger and more strongly sculptured, by having stronger spiral ridges on the base, and in color, which is predominantly reddish with a greenish tinge.

Height mm	Diameter mm	
15.0	19.5	"Finca Estable," Mayarí Arriba

Remarks. As Aguayo & Jaume comment (1954: 8), the color in this form is not of specific importance. In this case it is the larger size and the more rugose, vermiculate sculpture which are definitive.

Specimens examined. ORIENTE. Finca "Lorenzo Cobos Estable," Mayarí [Arriba], Oriente (E. Pujals).

Emoda mayarina mirandensis Aguayo & Jaume

Plate 5.

Emoda mayarina mirandensis Aguayo & Jaume 1954, Torreia, No. 21, p. 8, pl. 2, figs. 2, 4 ("Loma de la Cantera" cerca del Central Miranda, Palmarito de Cauto, Provincia de Oriente; holotype, MP 12593).

Description. "The present variety is distinguished from the typical subspecies by its larger size, its somewhat more depressed form, reddish color and narrower and less irregular sculpture" (translated).

Height mm	Diameter mm
16.0	21.0

Remarks. We have not seen specimens of this subspecies.

Emoda blanesi Clench & Aguayo

Plate 1, figures 12, 13; Plate 5.

Emoda blanesi Clench & Aguayo 1953, *in* Aguayo, Mem. Soc. Cubana Hist. Nat., 21: 301, pl. 35, figs. 1, 2 ("Embarradas" al norte de Banes, Oriente; holotype, MP 17324, from Embarradas north of Banes, Oriente, Cuba; paratype, MCZ 257553).

Description. Shell about 18 mm in diameter, subglobose, sublustrous and moderately strong. Whorls 4¼, moderately rounded, body whorl subinflated and barely descending at the aperture. Color reddish, tinged with yellow on the penultimate and body whorls, the yellow color generally becoming stronger as it approaches the aperture; peripheral band light colored with a darker reddish band bordering it below. Spire depressed, rounded. Aperture semilunate, white near lip, darker inside. Lip thickened inside, rounded, not flaring, basal tooth barely perceptible. Parietal callus very thin, white in the columellar region, transparent near outer margins. Suture moderately impressed. Postnuclear whorls sculptured with fine, curved axial cords that grow stronger on the successive whorls, the intervals being twice as wide as the axial cords on the body whorl. These cords are irregular and in occasional specimens run together, extending to the base without growing narrower. Spiral sculpture consisting of a subsutural depression on the last whorl, and composed of one to three small incisions on the wider and more depressed axial costae. Protoconch 1¼ whorls, slightly raised and sculptured with fine, curved axial wrinkles. Operculum with a thin internal corneous layer, yellowish and darker at the outer margins.

Height mm	Diameter mm	
13.8	16.8	Río Seco, Banes, Oriente
13.8	16.2	La Campana, Río Banes, Oriente
12.4	17.2	Río Seco, Banes, Oriente

Remarks. This species has a limited distribution along the north central shore of Oriente Province between Banes and Gibara. The shell is easily recognized by its color, the simple, nonflaring lip, the subglobose shape, and the impressed subsutural line. It differs from *pulcherrima* in having stronger axial costae, a simple lip, and in the presence of the subsutural groove with the incisions on the summit of the axial cords.

Specimens examined. ORIENTE. La Campana, Río Banes; Río Seco, Banes; Antilla; Loma de Carbón, barrio de Río Seco; N of Banes (both USNM).

Genus *Glyptemoda* Clench & Aguayo

Glyptemoda Clench & Aguayo 1950, Rev. Soc. Malacol. 'Carlos de la Torre,' 7: 61 (as a subgenus; type-species, *Helicina torrei* Henderson 1909, original designation).

Description. Shell like that of *Emoda sensu stricto*, but more depressed, exceedingly rough, dirty white in color, occasionally tinged with lemon yellow or purple, and sculptured with strong, thin lirae, separated by flat, much wider intervals. The operculum has the outer surface covered with small, more or less equisized, rounded, glassy granules. In this character it is between the operculum of *Emoda* with its unmarked surface and the strongly roughened surface of the operculum of *Schasicheila*. Periostracum wanting.

Remarks. Keen (1960: 286) synonymized *Glyptemoda* with *Emoda s. s.* We cannot agree with this decision. Instead we feel that this taxon should be raised to full generic rank.

Baker (1922) showed that the lateral tooth complex in Helicininae consists of a hammer-shaped comb-lateral structure with the basal pillar located at one end. In the subfamily Proserpininae, the pillar is centrally located, giving an anvil or T-shape to the structure. In *Glyptemoda* the basal pillar, consisting of two united portions separated by a deep vertical furrow, is almost as large as the top of the tooth itself (Pl. 7, fig. 1). Apparently this type of pillar can be derived more easily from Proserpininae than Helicininae but may be distinct enough to stand in a subfamily itself. There are other radular peculiarities in *Glyptemoda.* Five of the seven central teeth are oblong in shape and are weakly cusped. In this respect they differ from the lanceolate or obliquely lanceolate corresponding teeth of the Helicininae and Proserpininae. The numerous uncinals are strongly curved and have one or two weak cusps on the inner marginals to three to five rather strong cusps on the outer ones.

These radular characteristics, together with the strong surface sculpture and depressed shape of the shell, as well as the granule-covered outer surface of the operculum, induce us to recognize *Glyptemoda* as a full genus.

Glyptemoda torrei torrei (Henderson)

Plate 3, figures 1, 2; Plate 5.

Helicina torrei Henderson 1909, Nautilus, 23: 50, pl. 4, figs. 1–3 (Los Negros, 25 miles [sic] southeast of Bayamo in the province of Oriente, Cuba, "in woods on low limestone hills"; holotype, USNM 463791, paratypes, MCZ 20863).

Description. Shell much depressed, reaching almost 30 mm in diameter, lustreless, rough and very solid. Whorls 4¼, rapidly widening, almost flat, the last whorl descending shortly at the aperture. Color grayish white or cream, occasional specimens showing yellow or reddish purple on the spire. Spire planiform or slightly raised. Aperture semilunate, evenly rounded, generally white inside, occasional specimens with a tinge of yellow deep within. Lip flaring, white, thickened within, reflected above, widest above, gradually narrowing at the base, where it terminates in a very small, rounded tubercle. Parietal callus white, lustrous, not raised at the outer edge. Columella white, short, convex above, almost straight below. Suture well impressed. Surface with 17 to 20 thin, sharply raised spiral cords, crossed by regular, rather strong, diagonal axial sculpture. This sculpture crenulates the upper edge of the spiral cords. Intervals much wider than the cords, crossed by the axial growth lines. Protoconch 2 large whorls, smooth but with closely spaced, curved axial wrinkles, rather more closely spaced than in most species of *Emoda sensu stricto.* No periostracum. Operculum as in subgenus.

Height mm	Diameter mm	
16.5	28.9	Los Negros, Jiguaní, Oriente, paratype
16.0	29.0	Los Negros, Jiguaní, Oriente, paratype
14.0	30.5	Los Negros, Jiguaní, Oriente, paratype
13.5	26.0	Los Negros, Jiguaní, Oriente, paratype

Remarks. The number of spiral ridges varies from 17 to 20 in a series of paratype

specimens and from 15 to 20 in a series from the de la Torre collection merely labelled "Los Negros, Jiguaní." This variation in number may be due to the presence of thinner and lower subsidiary ridges in the intervals in some specimens. The colors as given by Henderson do appear in isolated specimens, but most, even those taken alive, are white or cream colored under an encrusting layer of dirt. The spire, which is completely flat in some specimens, is moderately to well raised in others. This might be a secondary sexual characteristic. Henderson's location of Los Negros at 25 miles southeast of Bayamo is in error. Los Negros in Oriente is only about nine miles from Bayamo.

Specimens examined. Oriente. Los Negros, 15 km SE of Bayamo.

Glyptemoda torrei freirei Clench & Aguayo

Plate 3, figures 3, 4; Plate 5.

Emoda (*Glyptemoda*) *torrei freirei* Clench & Aguayo 1950 Rev. Soc. Malacol. 'Carlos de la Torre,' 7: 61, pl. 12, figs. 1–3 (La Manuela, antes de llegar a la Furnia de la Mina Los Negros, Baire, Oriente; holotype, MP 12918; paratypes, MCZ 185798).

Emoda pujalsi Aguayo & Jaume 1954, Torreia, No. 21, p. 5, pl. 1, fig. 8 ("La Gloria," Union del Camino de Maffo a San Lorenzo y a Los Negros, Jiguaní, Provincia de Oriente; holotype, MP 17386).

Description. Shell as in *torrei* but differing in its smaller diameter (5 to 8 mm less than the nominate species), its proportionately more elevated shape, and by the spiral ridges, which are lower and flattened at the top rather than sharp. The specimens from the Cueva de Pepín are tinged with yellow or brick red.

Height mm	Diameter mm	
14.5	20.0	"La Gloria," Maffo (as *E. pujalsi*)
14.3	20.0	"La Gloria," Maffo (as *E. pujalsi*)
14.0	21.5	La Manuela (type-locality)

Remarks. According to Clench & Aguayo, José A. Freire, who collected the type specimens, reported that he found this subspecies in the lowlands, whereas *torrei torrei* lives in the higher elevations. We have not seen the operculum, but presumably it is similar to that of *torrei torrei.*

Emoda pujalsi Aguayo & Jaume is a neighboring population that differs from the present subspecies only in degree. The two forms are found close together in the vicinity of Los Negros, and there is little doubt that they are the same.

Specimens examined. Oriente. La Muela; Cueva de Pepín, Baire (USNM); "La Gloria," Maffo, Jiguaní (type locality of *E. pujalsi*).

Emoda (?) *clementis* Clench & Aguayo

Plate 3, figure 5.

Emoda clementis Clench & Aguayo 1950, Rev. Soc. Malacol. 'Carlos de la Torre,' 7: 62, pl. 12, figs. 1, 5; (Cayo del Rey, Mayarí, Oriente; holotype, MP 12923; paratype, MCZ 185799).

Description. Shell imperforate, thin, fragile, and translucid. Color uniformly bluish green. Whorls 2 in the juvenile specimens, suture well impressed, body whorl with rounded keel. Spire depressed, little raised above the plane of the body whorl. Aperture semilunate; umbilical callus microscopically granulose. Columella short, blending gradually into the basal lip. The spiral sculpture consists of irregular microscopic striae grouped in unequal series; axial sculpture of fine irregular, diagonal, growth lines. Protoconch 1½ whorls, axially striated, the striations crossed by spiral lines; with four curved, rounded furrows at the distal portion. Periostracum imperceptible; operculum thin, green, smooth, nucleus submarginal, with a sculpture of concentric lines.

Height mm	Diameter mm	
6.5	10	(juvenile)

Remarks. This species was described on the basis of four juvenile specimens, and was doubtfully assigned to *Emoda.* These doubts are justified. The protoconch, as described by the authors and as seen in the

specimen in MCZ, lacks the regular, curved, axial striae or wrinkles that characterize the genus, and also shows faint spiral sculpture that is not found on the protoconch of *Emoda sensu stricto*. The shell is very fragile, almost transparent, weaker than the customarily strong shell of *Emoda*, even in juvenile specimens. The true placement of *clementis* Clench & Aguayo must await the discovery of additional and more mature specimens.

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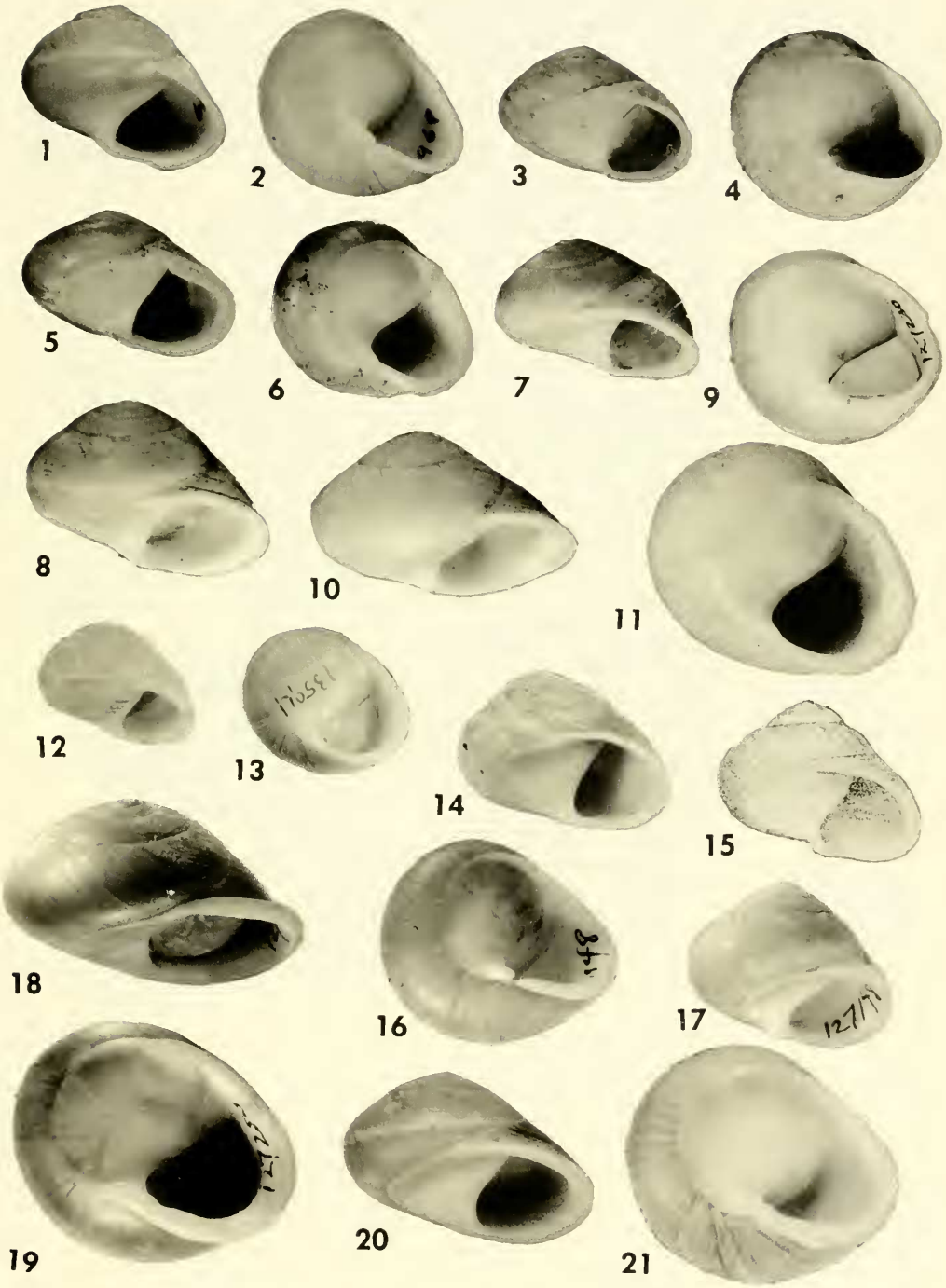
PLATE 1. Figs. 1 and 2. *Emoda submarginata* (Gray), El Grillo, Madruga, Havana, MCZ 60969, Topotype (1.5 ×). Figs. 3 and 4. *E. najazaensis* Aguayo & Jaume, El Cacaotal, Sierra de Najaza, Camagüey, MCZ 257422, Paratypes (1.5 ×). Figs. 5 and 6. *E. bermudezi* Aguayo & Jaume, Banao, Cubitas Mountains, Camagüey, MCZ 262719 (1.5 ×). Fig. 7. *E. ciliata* (Poey), San Juan de Letrán, Trinidad, Las Villas, Lectotype, MCZ 262717 (1.5 ×). Figs. 8 and 9. *E. ciliata* (Poey) same locality, MCZ 127230, Topotypes (1.5 ×). Figs. 10 and 11. *E. ciliata guisana* Wagner, "Cuba," MCZ 262718 (1.5 ×). Figs. 12 and 13. *E. blanesi* Clench & Aguayo, Río Seco, Banes, Oriente, MCZ 135961 (1.2 ×). Fig. 14. *E. pulcherrima* (Lea), USNM 104613, Lectotype (1.5 ×). Fig. 15. *E. pulcherrima* (Lea), Trans. American Philos. Soc. (NS), pl. 19, fig. 57, photographic copy. Figs. 16 and 17. *E. sagraiana* (Orbigny), Ensenada de los Burros, Cabezas, Pinar del Río, MCZ 127148 (1.5 ×). Figs. 18 and 19. *E. sagraiana* forma *percrassa* Aguayo & Jaume, La Güira, Luis Lazo, Pinar del Río, MCZ 127253 (1.5 ×). Figs. 20 and 21. *E. silacea* (Morelet), Yunque de Baracoa, Oriente, Topotype, MCZ 127229.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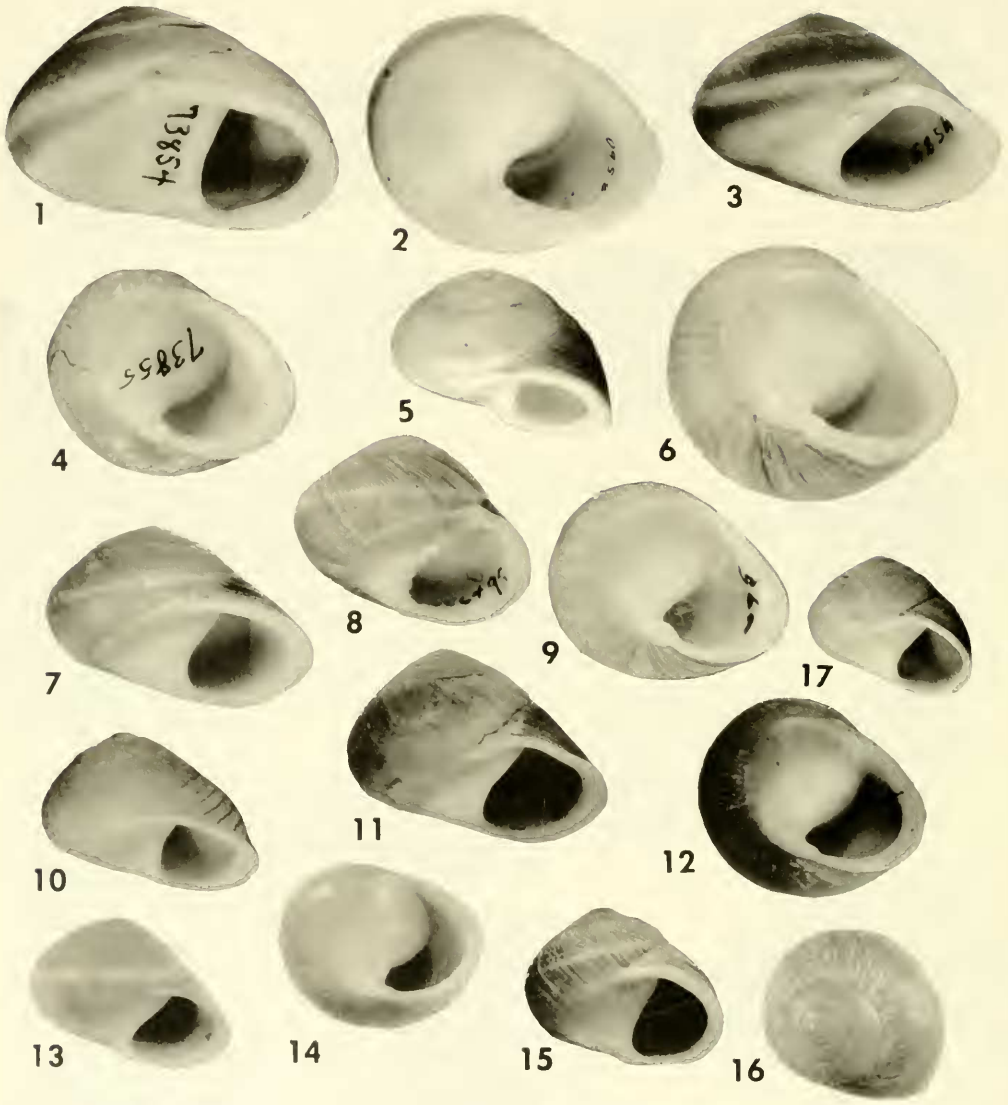

PLATE 2. Fig. 1. *Helicina briarea* Poey, Trinidad Mountains, Santa Clara [Las Villas], MCZ 73854, Lectotype (1.4 ×). Figs. 2 and 3. *E. briarea* (Poey), "Puriales," Trinidad Mountains, Las Villas, MCZ 58560 (1.4 ×). Fig. 4. *Helicina bayamensis* Poey (Buena Vista, Bayamo, Oriente) MCZ 73855, Lectotype (c. 1.4 ×). Fig. 5. ditto, MCZ 256496, Paralectotype. Figs. 6 and 7. *Emoda emoda* Pfeiffer, Manatial de Santa Fé, Oriente, MCZ (1.2 ×). Figs. 8 and 9. *Helicina titanica* Poey, Baracoa (Oriente), MCZ 256495, Syntypes (1.2 ×). Fig. 10. *Emoda pujalsi* Aguayo & Jaume (= *tarrei freirei* Clench & Aguayo), Loma La Gloria, Maffa, Jiguaní, Oriente, MCZ 263902, Topotype (2.1 ×). Fig. 11. *Emoda caledoniensis* n. sp., Mina Caledonia, Mayarí, Oriente, MCZ 261352, Paratype (1.2 ×). Fig. 12. ditto, 1 km from pine forest, Mayarí, MCZ 261349, Paratype (1.2 ×). Figs. 13 and 14. *E. pulcherrima* (Lea), Pico Turquino, bet. 2000 and 5000 ft., Oriente, MCZ 267577 (1.5 ×). Figs. 15 and 16. *E. mayarina gutierrezi* Aguayo & Jaume, Finca Estable, Mayarí Arriba, Oriente, Paratype, MCZ 187562 (1.2 ×). Fig. 17. *Helicina mayarina* Poey, Mayarí, Oriente, Syntype, USNM. (1.5 ×).

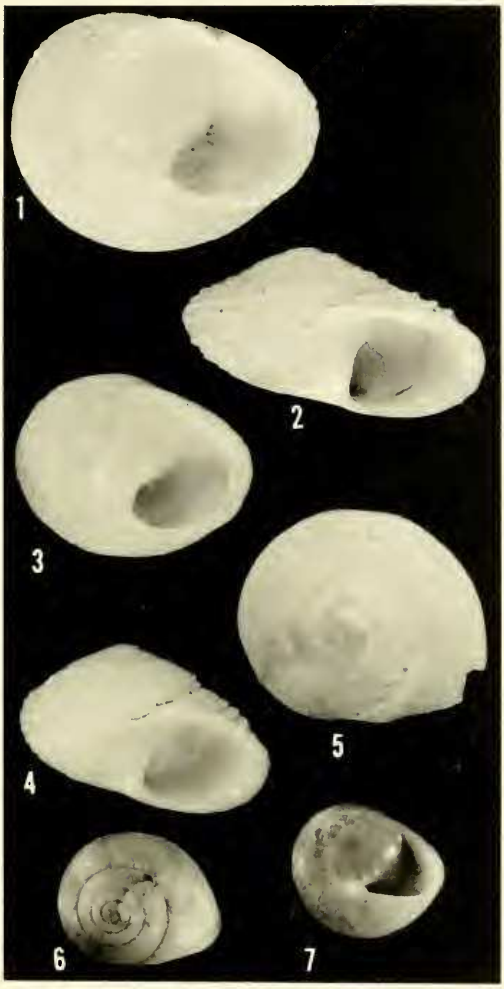

PLATE 3. Figs. 1 and 2. *Glyptemoda torrei torrei* Henderson, Los Negros, Jiguaní, Oriente, MCZ 20863, Paratypes (1.5 ×). Figs. 3 and 4. *Glyptemoda torrei freirei* Clench & Aguayo, La Manuela near the mine, Baire, Oriente, MCZ 185798, Paratype (1.5 ×). Fig. 5. *Emoda ? clementis* Clench & Aguayo, photographic copy of original figure, Rev. Soc. Mal., 7: pl. 12, fig. 4. Figs. 6 and 7. *Helicina crassa* Orbigny (= *pulcherrima* Lea), Syntype, BM(NH) No. 1854.100.4.169 (1 ×). (Photo courtesy of Angela Cane, BM(NH).)

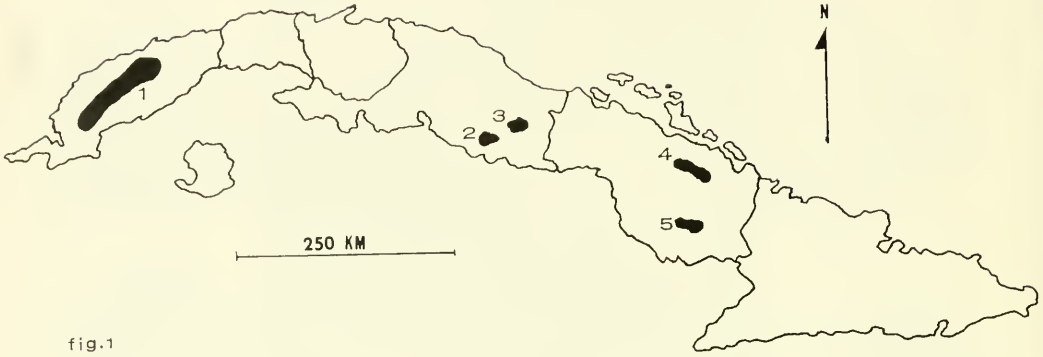

fig.1

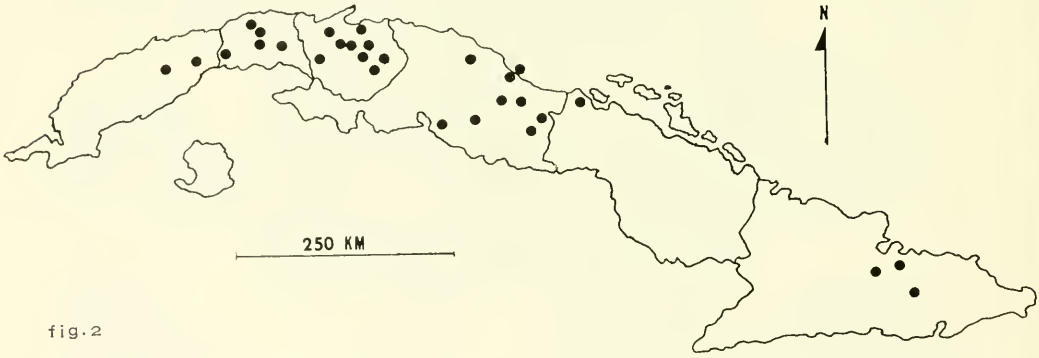

fig.2

PLATE 4. Fig. 1. Distribution of (1) *Emoda sagraiana* (Orbigny); (2) *E. briarea* (Poey); (3) *E. ciliata* (Poey); (4) *E. bermudezi* Aguayo & Jaume; (5) *E. najazaensis* Aguayo & Jaume. Fig. 2. Distribution of *Emoda submarginata* (Gray).

PLATE 5. Distribution of *Emoda* in Oriente Province. (A) *Emada pulcherrima* (Lea); (B) *E. pulcherrima titanica* (Poey); (C) *E. silacea* (Morelet); (D) *E. emoda* (Pfeiffer); (E) *E. submarginata* (Gray); (F) *E. bayamensis* (Poey); (G) *E. caledoniensis* Clench & Jacobson, n. sp.; (H) *E. mayarina gutierrezi* Aguayo & Jaume; (I) *E. mayarina mirandensis* Aguayo & Jaume; (J) *E. blanesi* Clench & Aguayo; (K) *Glyptemoda torrei torrei* (Henderson); (L) G. *torrei freirei* Clench & Aguayo.

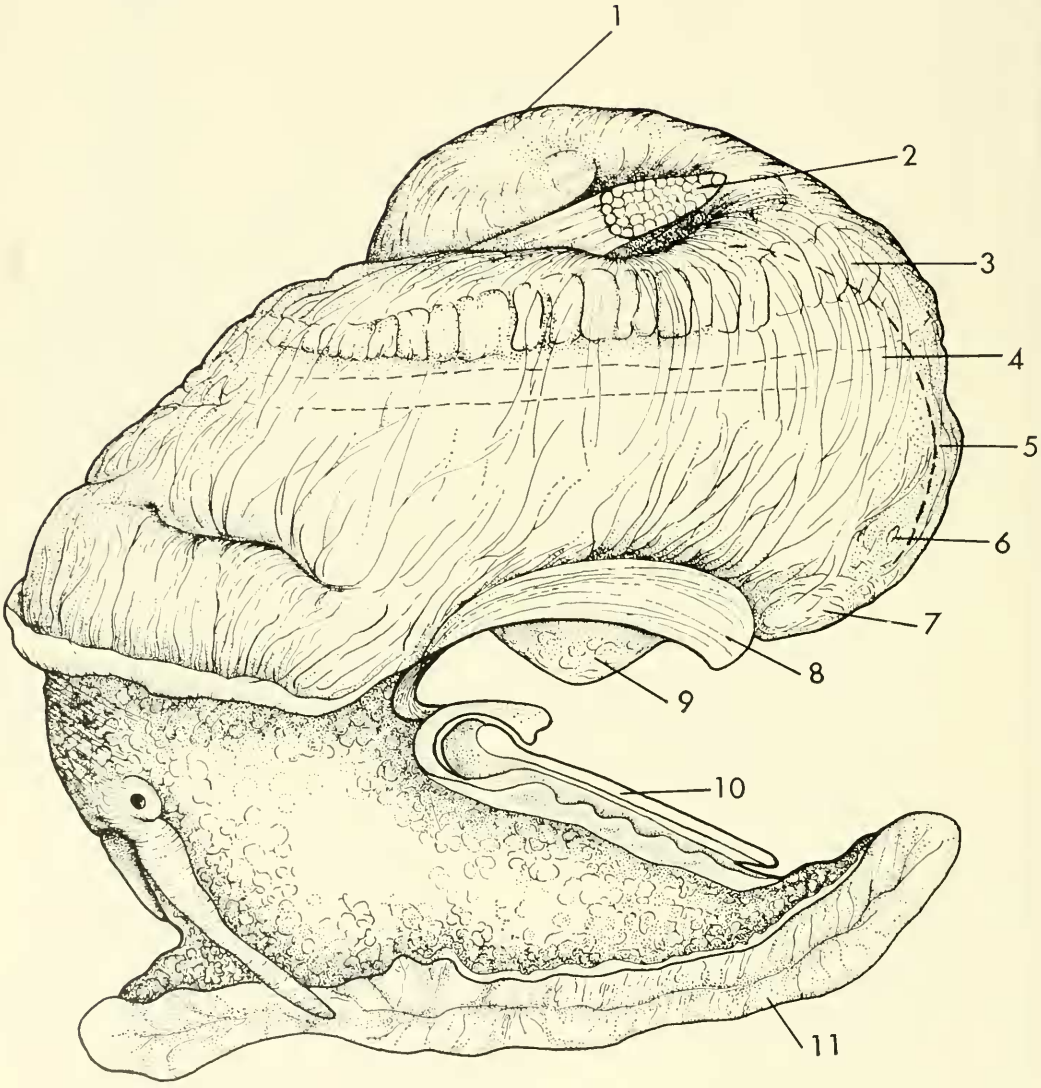

PLATE 6. 1. Digestive gland. 2. Right columellar retractor muscle. 3. Male reproductive gland. 4. Intestine. 5. Posterior end of mantle cavity. 6. Nephripore. 7. Pericardium. 8. Left columellar muscle. 9. Gonads. 10. Operculum. 11. Base of foot.

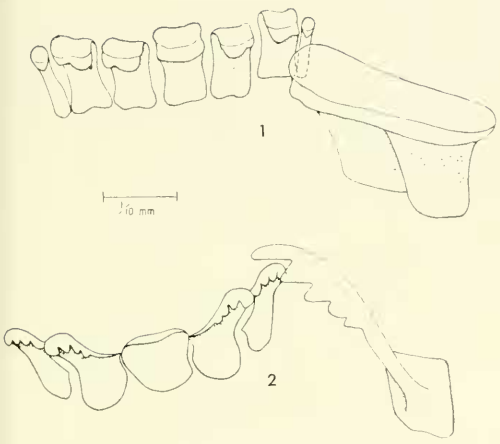

PLATE 7. Fig. 1. *Glyptemoda tarrei* (Henderson), Parotype, MCZ 20863, Los Negros, 25 mi. SE of Bayamo, Oriente, Cuba. Central and lateral tooth complexes, showing main plate of lateral complex only. Fig. 2. *Emoda submarginata* (Gray), MCZ 127233, El Mamey, Buena Vista, Las Villas, Cuba, ex Bermúdez. Central and lateral tooth complexes, showing main plate of lateral complex only.

Table 1. Distribution of the Species of *Emoda* and *Glyptemoda*

	Pinar del Río	Havana	Matanzas	Las Villas	Camagüey	Oriente
sagraiana	X					
silacea						X
pulcherrima						X
p. titanica						X
submarginata	X	X	X	X	X	X
ciliata				X		
c. guisana				?		
emoda						X
caledoniensis						X
bayamensis						X
bermudezi					X	
najazaensis					X	
briarea				X		
mayarina						X
m. gutierrezi						X
m. mirandensis						X
blanesi						X
torrei torrei						X
torrei freirei						X

INDEX

Note: Synonyms are italicized.